May 27, 1941. R. R. WALKER 2,243,490

PENCIL SHARPENER

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Fig. 1.

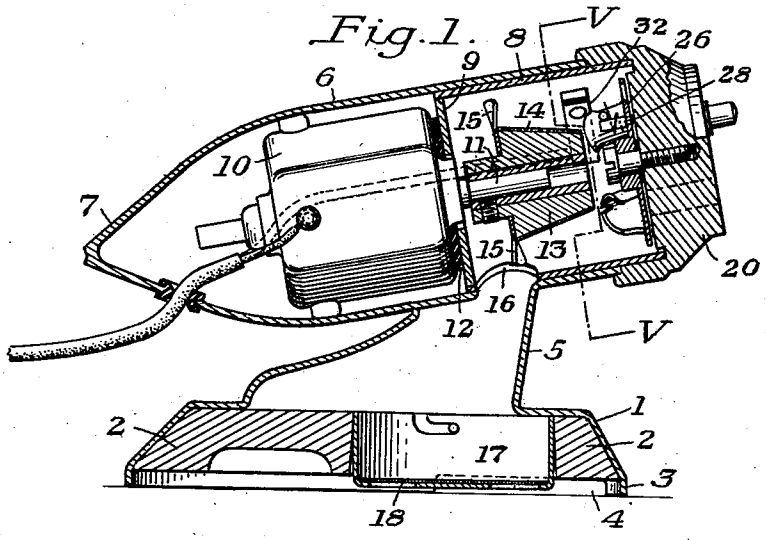


Fig. 2.

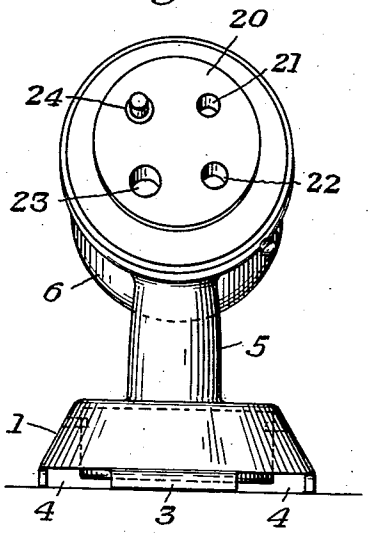


Fig. 3.

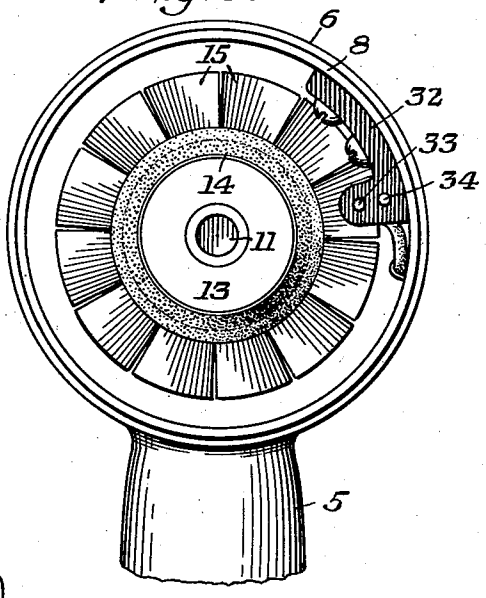
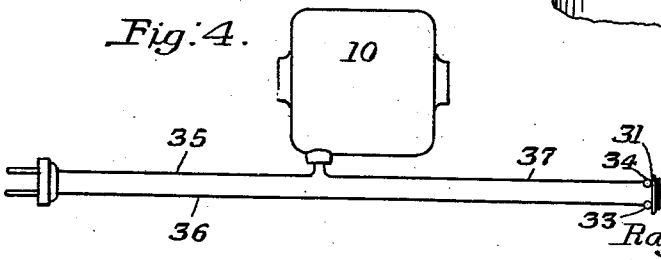


Fig. 4.



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Fig. 5.

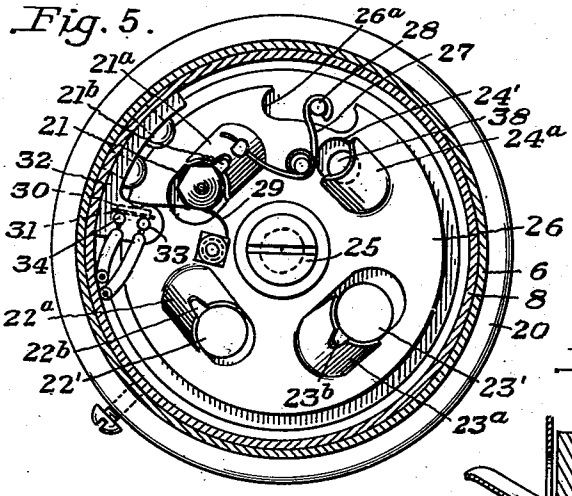


Fig. 7.

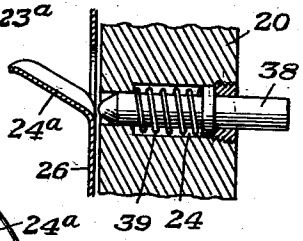


Fig. 6.

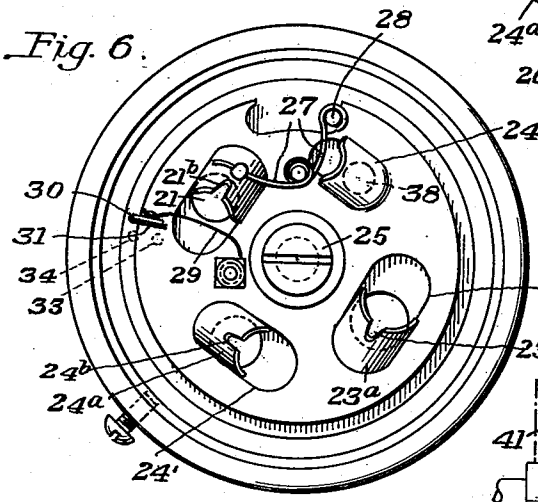


Fig. 9.

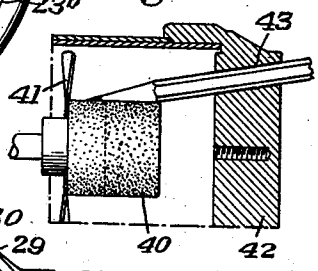
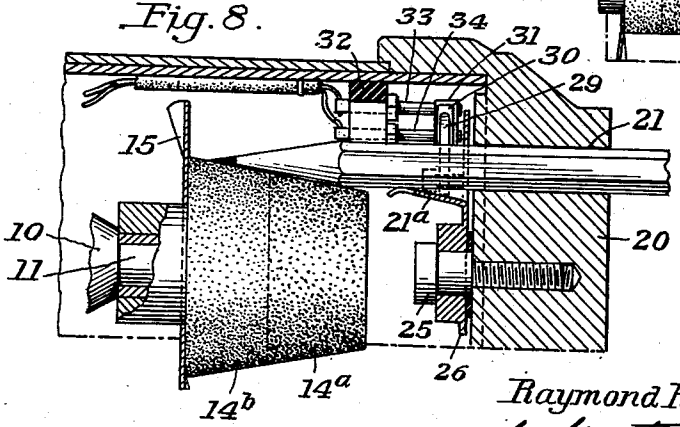


Fig. 8.



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UNITED STATES PATENT OFFICE

2,243,490

PENCIL SHARPENER

Raymond R. Walker, Follansbee, W. Va., assignor of one-half to George S. Hahne, Follansbee, W. Va.

Application October 10, 1939, Serial No. 298,807

5 Claims. (Cl. 120—96)

This invention is for an improvement in pencil sharpeners and pertains especially to pencil sharpeners which are adapted to be electrically driven and wherein the pencil is sharpened by contact with an abrasive surface.

It has heretofore been proposed to construct pencil sharpeners with abrasive disks or wheels which may be rotated while the pencil is being sharpened and the pencil is held against the face of such disk or wheel. While such devices may be satisfactorily used, an abrasive wheel or disk which is satisfactory for the purpose must be several inches in diameter and any sharpener employing such arrangement must be quite large. Another difficulty with pencil sharpeners of this character is that the speed of the abrasive surface near the periphery of the disk is very much greater than the speed of the abrasive surface near the center so that the abrasive action takes place much more rapidly at a distance back from the point of the pencil than at the point itself.

The present invention provides a pencil sharpener wherein there is an abrasive element which is generally in the form of a drum. It is mounted on a shaft so that it may be rotated about its axis at relatively high speed. In conjunction with the drum there is an enclosing structure and a pencil guide having an opening therethrough through which a pencil may be inserted and moved into contact with the abrasive surface of the drum. The abrasive surface of the drum and the pencil guide are so arranged or positioned with respect to each other that the abrasive surface forms an acute angle with the longitudinal axis of the pencil. This may be accomplished for example by having the axis of the guide end of the pencil which passes through the guide parallel with the axis about which the abrasive drum rotates but eccentric thereto and with the abrasive surface generally conical, or it may be accomplished by using a cylindrical abrasive element and having the axis of the pencil guide end of the pencil at an angle with respect to the axis of the drum. An abrasive drum of the character required may be of relatively small diameter and can be driven by a small compact electric motor. My invention enables a motor-driven pencil sharpener to be provided in a size convenient for desk use and which is extremely compact and which may be embodied in various ornamental shapes.

According to the present invention there is also provided a means in conjunction with the pencil guide whereby the insertion of a pencil in the guide in position to be sharpened will automatically close a circuit for energizing the motor and removal of the pencil will cause the circuit to be opened.

My invention may be readily understood by reference to the accompanying drawings which illustrate certain present preferred embodiments of my invention and in which

Figure 1 is a longitudinal vertical section through a complete sharpener assembly embodying my invention;

Figure 2 is a front elevation of the device shown in Figure 1;

Figure 3 is a front elevation on a larger scale than Figure 2 with the perforated end member constituting the pencil guide removed therefrom, showing the conical abrasive element and the fan in elevation, this view being on a larger scale than the preceding figures;

Figure 4 is a circuit diagram diagrammatically showing the driving circuit for the motor;

Figure 5 is a transverse vertical section in the plane of line V—V of Figure 1 but on a larger scale, the view showing the pencil-operated switch arrangement on the inner face of the pencil guide, the view showing the position of the parts at the time the circuit is being made;

Figure 6 is a view generally similar to Figure 5 showing the switch mechanism in the normal position in which the circuit to the motor is open;

Figure 7 is a detail sectional view of a push-pin arrangement which may be provided for operating the switch mechanism independently of any pencil to close the switch to the motor at any time and which is particularly convenient for the sharpening of leads which are not in pencils;

Figure 8 is a longitudinal sectional view through a portion of the pencil sharpener showing a pencil engaged with the abrasive element; and

Figure 9 is a view similar to Figure 8 showing a modification in which the abrasive element in cylindrical and in which the pencil guide is at an angle to the cylinder, the view being a schematic view, the detailed construction and arrangement of the parts not being illustrated.

Referring first to the construction shown in Figures 1 to 8 inclusive, 1 designates a supporting base which is preferably weighted as indicated at 2, the base having downwardly projecting portions 3 which are spaced from one another to provide openings 4 between the base and the surface on which the base is set. Carried by the base 1 is a support or pedestal 5 on which is secured a metal housing or shell 6. This shell is illustrated as being of generally cylindrical form with the front end thereof open and with one end 7 thereof closed. Fitted within the member 6 is a cylindrical cup-like member 8 with an end plate 9 at the inner end thereof. Supported on the inner face of the end plate 9 is an electric motor 10 whose shaft 11 projects into the interior of the cup or casing 8. A rubber gasket 12 is preferably provided in the end wall or plate 9 around the bearing for the shaft 11 to dampen vibration and to prevent dust and wood flour

from sifting back into the part of the casing 6 in which the motor is housed.

On the forward end of the motor shaft 11 is a supporting element 13 which carries an abrasive drum 14. The abrasive drum may be fabricated in various ways. For example, abrasive material may be glued directly to the surface of the supporting cone 13, or a molded or shaped abrasive cone 14 may be slipped over the support 13, or abrasive coated fabric may be glued about the surface of the supporting element 13 or the abrasive surface may be provided by rasp-like teeth formed of metal. Carried on the supporting member 13 at the rear thereof so as to rotate therewith is a fan wheel 15.

The cup-like member 8 is provided with an opening therethrough at 16, this port 16 opening into the pedestal 5, this pedestal being hollow to form an air duct. The arrangement is such that the fan wheel 15 sucks air from the front end of the device rearwardly and discharges it through the port 16. The material abraded from the pencil while it is being sharpened is carried by this stream of air into the pedestal 5. There is a removable cup 17 in the base which has a plurality of holes in the bottom thereof over which a filtering membrane 18 is held, the arrangement being such that the draft of air going downwardly through the pedestal 5 passes through the membrane 18 and out the openings 17. The entrained solid material is caught by the membrane 18 and collected in the removable cup from whence it may be emptied from time to time. The openings 4 provided by the feet 3 on the base enable the air which has been thus circulated to escape from beneath the base and thus prevent the building up of any back pressure.

Secured to the front of the casing 6 is a removable cap member 20 having one or more eccentrically positioned openings 21, 22, 23 and 24 therein. The openings 21, 22 and 23 preferably are of different diameters to accommodate different sized pencils, and the axes of these openings are parallel to the axis of the shaft 11. The openings 21, 22, 23 and 24 are positioned at such a distance from the center of the cap 20 that the axis of each hole 21, 22, 23 or 24 if projected will intersect the surface of the abrasive cone 14 at a point intermediate the ends of said cone. The cap 20 with its openings 21, 22 and 23 provides the pencil guide.

Pivoted to the inner face of the cap 20 by means of a bolt 25 is a disk 26 having a series of openings therein at 21', 22', 23' and 24', these openings being spaced from the center of the disk and being spaced from each other in such manner that they may be brought into register with the openings 21, 22, 23 and 24 respectively in the cap. Projecting upwardly from the face of the disk 26 are inclined vanes or cam elements 21*a*, 22*a*, 23*a* and 24*a*. There is one of these vanes adjacent each of the openings 21', 22', 23' and 24'. A light spring 27 connected to the inner face of the cap, it being attached at one end to a pin 28 on the cap and also mounted on the disk 26, serves to normally rotate the disk to the position shown in Figure 6 where the outer ends of the vanes 21*a*, 22*a* and 23*a* lap over or obstruct the pencil guide openings 21, 22 and 23, and the vane 24*a* overlaps the opening 24. The disk 26 is notched at 26' to provide clearance for the pin 28 and limit the arc through which the disk may be moved. The arrangement is such that when a pencil is pushed through one of the openings as for example, the opening 21, the end of the pencil will strike the inclined cam or vane 21*a* and thereby rotate the disk 26 against the compression of the spring 27 through a slight angle to the position shown in Figure 5. When the pencil is withdrawn from the opening 21, the disk 26 will rotate in the opposite direction as the pencil pulls back away from the cam or vane element 21*a*. This rotation of the disk 26 upon insertion of the pencil is used to close a switch to the motor and the reverse movement of the disk which occurs upon withdrawal of the pencil is used to break the circuit to the driving motor. The switch mechanism illustrated comprises a resilient arm 29 secured to the disk 26. This arm carries a strip of insulation 30 at its free outer end and a conducting bar 31 is carried on this insulating block or strip 30. A small block of insulating material 32 is secured to the inside of the casing 8 near the forward end thereof and this member supports two spaced contact pins 33 and 34. When the disk 26 is rotated to the position shown in Figure 5, the conducting strip 31 will press against both of the pins 33 and 34 to close a circuit between them. When the disk 26 rotates to the position shown in Figure 6, the strip 31 is carried away from the pins 33 and 34 opening the circuit to the driving motor. This is clearly apparent in Figure 4 where one wire 35 leads from a source of supply directly to the motor whereas the other wire 36 leads to pin 33. A second wire 37 leads from pin 34 to the other terminal of the motor. When the contact strip 31 is pressed against the pins 33 and 34, the motor circuit is closed. The arm 29 is resilient in order to yield after contact has been made and permit over-travel of the disk 26.

From the foregoing description, the operation of the device may be easily understood. Assuming the wires 35 and 36 to be connected with a source of current, the operator merely pushes a pencil into one of the openings 21, 22 or 23 depending upon the size of the pencil and as the pencil is pushed through the pencil guide opening it will engage one of the vanes on the disk 26 to rotate this disk and close the circuit to the motor whereupon the abrasive cone 14 will immediately be rotated at high speed. As the pencil continues to move in, the end of the pencil will move into contact with the abrasive surface 14. The operator should rotate the pencil as it is being sharpened and a conical point will be quickly formed on the pencil. For drafting purposes it is possible of course to shape the end of the lead to any desired form by proper manipulation of the pencil. As soon as the pencil is sharpened it may be withdrawn and as it is withdrawn the disk 26 will rotate in the reverse direction to open the circuit to the motor.

In order to prevent pressure from being exerted against the lead of the pencil when it is being inserted or withdrawn from the pencil guide, the ends of the vanes 21*a*, 22*a* and 23*a* are all preferably notched out as indicated at 21*b*, 22*b* and 23*b* respectively. These notches keep the vane from exerting any pressure against the lead inasmuch as the notches are wide enough so that the lead itself will not contact the vanes and pressure will be applied to the vanes only when the wood of the pencil is in a position to engage the vanes.

Under some circumstances it is desirable to manually set the motor into operation. For this purpose a push-pin 36 is mounted in the opening 24. The outer end of this push-pin projects beyond the outer end of the cap 20, as clearly shown

in Figure 1. The inner end of the push-pin is normally clear of this disk **26**. When the pin **38** is pushed inwardly, however, the inner end of this pin will engage the vane **24***a* of the disk **26** and rotate the disk in the same manner that it is operated when a pencil is inserted through one of the other guide openings. A compression spring **39** serves to normally hold the pin in its projected position.

I have found it convenient to have the abrasive surface **14** so constructed that the part of the abrasive face which finally shapes the lead of the pencil is finer than the portion of the cone which first abrades away the wood. This is illustrated in Figure 8 where a portion **14***a* of the drum is of coarser abrasive material than the portion **14***b* thereof. If a new unsharpened pencil is inserted in the sharpener, the wood will first be abraded away by the surface **14***a* but only after the wood has been tapered off can the pencil be inserted far enough to bring its end into contact with the finer abrasive surface **14***b*.

The sharpener described is of a compact form. It can be of ornamental appearance and can be of a size such as to be conveniently employed on a desk. Its operation requires merely the insertion of the pencil in the opening and the twisting of the pencil while it is being sharpened and only a few seconds are required to sharpen a pencil. By reason of the fact that the pencil is sharpened by an abrading action instead of by a milling action as is customary in pencil sharpeners using conical planetary cutters, the sharpening of the pencil can be effected with much less strain on the pencil and without any likelihood whatever of the lead being broken back in the wood of the pencil. The draft of air created by the fan at the back of the abrasive cone draws all of the dust and wood flour through the rear of the casing **8** and deposits it in the container **17** which may be emptied from time to time, the air itself being filtered before it is discharged back into the room. For the purpose of repair it is merely necessary to remove the cap **20**. The cup-like member **8** may then be slid out of the housing or shell **6** and the motor will come out with the member **8**.

In the modification shown in Figure 9, the abrasive drum designated **40**, instead of being in the form of a cone is in the form of a cylinder. A fan wheel **41** is provided at the end thereof. The device may be of a construction such as shown in Figure 1. There is a cap member **42** in advance of the drum **40** and this cap member is provided with one or more holes **43** forming pencil guides. The holes **43**, instead of being parallel with the axis of rotation of the drum **40**, have their axes inclined so that if projected to intersect the axis of the drum, they form an acute angle therewith. In either case the pencil and the abrasive surface form an acute angle with each other so as to produce a tapered point on the pencil. The automatic switch arrangement previously described in connection with Figures 1 to 8 may be employed in the arrangement shown in Figure 9, although for the purpose of clarity and simplification of illustration I have not shown the automatic switch in the modification.

While I have illustrated and described certain embodiments of my invention, it will be understood that this is by way of illustration and that various changes and modifications may be made therein within the contemplation of my invention and within the scope of the following claims.

I claim as my invention:

1. A pencil sharpener comprising a support, a motor carried by the support, a shaft driven by the motor, an abrasive drum on said shaft, a fan on said shaft at one end of the drum, a pencil guide carried by the support adjacent the other end of the drum, said guide having an opening therethrough through which a pencil may be inserted, the axis of the opening when projected intersecting the surface of the drum intermediate the ends thereof, an enclosure surrounding the drum and fan and having a port therethrough rearwardly of the drum and fan through which a current of air generated by the fan may be forced, dust-collecting means in the support, the supoprt having a duct therein leading from said port to said dust collector.

2. A pencil sharpener comprising a supporting structure having a housing thereon, a removable unit in the housing comprising a cup-like casing having a motor secured to the bottom thereof outside the cup-like member and having a shaft which projects into said cup-like member, a drum carried on said shaft having an abrasive surface, a cap at the end of said cup-like member forming a closure therefor and constituting a pencil guide, said cap having a pencil-receiving opening extending therethrough the axis of the opening when projected intersecting the periphery of the drum at a point intermediate the ends of the drum.

3. A pencil sharpener comprising a support having a hollow shell thereon, a receptacle fitted into the shell of cup-like form, a motor in the shell at the back of said receptacle having a shaft which projects through the bottom of the receptacle into the interior thereof, a drum having an abrasive surface on said shaft, a fan on said shaft between the cone and the bottom of the receptacle, a pencil guide secured to the end of said receptacle, said pencil guide having a pencil-receiving opening therethrough the axis of which when projected intersects the surface of the cone intermediate the ends of the cone, said receptacle having a port therein rearwardly of the fan, said support having a duct therein communicating with said port and a dust collector in the support with which said duct communicates whereby debris formed by the abrading of the pencil is blown rearwardly by said fan and forced through said duct to said dust collector.

4. A pencil sharpener comprising an abrading drum and means for rotating it, an enclosure about the drum, means at one end of the enclosure for holding a pencil at an angle to the periphery of said drum for pointing the pencil, a passageway leading from said enclosure, and means driven with the drum for forcing air and solid particles from the enclosure through said passageway, and a dust-collector in which said passageway terminates.

5. A pencil sharpener comprising a stand having a base, means in the base constituting a dust collector, a shell supported by the base adapted to house a motor having an abrasive drum therein positioned to be driven by a motor so housed, means in the shell operatively connected with the drum for forcing dust and air from the shell into the dust collector, and means for guiding a pencil into proper angular relation with the abrasive drum.

RAYMOND R. WALKER.